CLAIMS

1. A monoclonal antibody capable of binding to a protein which is specifically recognized by the monoclonal antibody produced by the hybridoma deposited at the Deutsche Sammlung von Microorganismen und Zellkulturen GmbH under the accession number DSM ACC2583 or a fragment thereof.

2. A hybridoma cell line deposited at the Deutsche Sammlung von Microorganismen und Zellkulturen GmbH under the accession number DSM ACC2583.

3. A monoclonal antibody according to claim 1 or a fragment thereof binding to the extracellular I-domain of the integrin alpha10beta1.

4. A monoclonal antibody according to claim 1or a fragment thereof binding to the extracellular I-domain of the integrin alpha10beta1 produced by the hybridoma cell line according to claim 2.

5. A method for isolating a population of mammalian mesenchymal stem cells, the method comprising the steps of

a) providing a cell suspension comprising mammalian mesenchymal stem cells,
b) contacting the cell suspension in a) with a monoclonal antibody or a fragment thereof binding to the extracellular I-domain of integrin alpha10beta1, under conditions wherein said monoclonal antibody or a fragment thereof forms an antibody-antigen complex with the extracellular domain of integrin alpha10beta1,
c) separating cells binding to the monoclonal antibody or a fragment thereof in b), and optionally
d) recovering cells binding to the monoclonal antibody or a fragment thereof in c) from said antibody or a fragment thereof,

thereby producing a population of mammalian mesenchymal stem cells, optionally free from said antibody or a fragment thereof.

6. A method for isolating a population of mammalian chondrocytes, the method comprising the steps of

a) providing a cell suspension comprising chondrocytes,
b) contacting the cell suspension in a) with a monoclonal antibody or a fragment thereof binding to the extracellular domain of integrin alpha10beta1, under conditions wherein said monoclonal antibody or a fragment thereof forms an antibody-antigen complex with the extracellular I-domain of integrin alpha10beta1,
c) separating cells binding to the monoclonal antibody or a fragment thereof in b), and optionally
d) recovering cells binding to the monoclonal antibody or a fragment thereof in c) from said antibody or a fragment thereof,

thereby producing a population of chondrocytes, optionally free from said antibody or a fragment thereof.

7. A method for isolating a sub-population of mammalian ES cells, the method comprising the steps of
a) providing a cell suspension comprising ES cells,
b) contacting the cell suspension in a) with a monoclonal antibody or a fragment thereof binding to the extracellular domain of integrin alpha10beta1, under conditions wherein said monoclonal antibody or a fragment thereof forms an antibody-antigen complex with the extracellular I-domain of integrin alpha10beta1,
c) separating cells binding to the monoclonal antibody or a fragment thereof in b), and optionally
d) recovering cells binding to the monoclonal antibody or a fragment thereof in c) from said antibody or a fragment thereof,
thereby producing a population of chondrocytes, optionally free from said antibody or a fragment thereof.

8. The methods according to any of claims 5-7, wherein the monoclonal antibody or a fragment thereof binding to the extracellular domain of integrin alpha10beta1 is a monoclonal antibody or a fragment thereof binding to the extracellular I-domain of integrin alpha10beta1 produced by the hybridoma cell line according to claim 1.

9. The methods according to any of claims 5-8, wherein the monoclonal antibody or a fragment thereof is linked to a solid phase.

10. The methods according to any of claims 5-9, wherein the solid phase are beads.

11. The methods according to any of claims 5-10, wherein the mammalian cells are human cells.

12. The methods according to claim 5-11, wherein the mammalian cells are murine cells.

13. A population of mammalian mesenchymal stem cells obtainable by the methods according to any of claims 5, and 8-12.

14. The population of mammalian stem cells according to claim 13, being human mesenchymal stem cells.

15. The population of mammalian stem cells according to claim 13, being murine mesenchymal stem cells.

16. A population of mammalian chondrocytes obtainable by the methods according to any of claims 6, and 8 -12.

17. The population of mammalian chondrocytes according to claim 16, being human chondrocytes.

18. The population of mammalian chondrocytes according to claim 16, being murine chondrocytes.

19. A subpopulation of mammalian ES cells obtainable by the methods according to any of claims 7, and 8 -12.

20. The population of mammalian chondrocytes according to claim 19, being human chondrocytes.

21. The population of mammalian chondrocytes according to claim 19, being murine chondrocytes.

22. A method for detecting a mesenchymal stem cell in a sample, the method comprising the steps of

a) providing a sample cell suspension comprising a mesenchymal stem cell,
b) contacting said sample cell suspension with a monoclonal antibody or a fragment thereof binding to the extracellular domain of integrin

alpha10beta1,

c) incubating the sample cell suspension and the monoclonal antibody or a fragment thereof under conditions wherein said monoclonal antibody or a fragment thereof forms an antibody-antigen complex with the extracellular domain of integrin alpha10beta1 on a mesenchymal stem cell,

d) optionally adding a second labelled antibody or a fragment thereof to the sample, wherein the second antibody or a fragment thereof binds to the monoclonal antibody or a fragment thereof in b)

e) detecting the monoclonal antibody or a fragment thereof bound to the extracellular domain of integrin alpha10beta1of the sample b), or optionally detecting the second labelled antibody or a fragment thereof in c) bound to the monoclonal antibody or a fragment thereof,

thereby detecting the mesenchymal stem cell.

23. A method for detecting a chondrocyte in a sample, the method comprising the steps of

a) providing a sample cell suspension comprising a chondrocyte,

b) contacting said sample cell suspension with a monoclonal antibody or a fragment thereof binding to the extracellular domain of integrin alpha10beta1,

c) incubating the sample cell suspension and the monoclonal antibody or a fragment thereof under conditions wherein said monoclonal antibody or a fragment thereof forms an antibody-antigen complex with the extracellular domain of integrin alpha10beta1 on a chondrocyte,

d) optionally adding a second labelled antibody or a fragment thereof to the sample, wherein the second antibody or a fragment thereof binds to the monoclonal antibody or a fragment thereof in b)

e) detecting the monoclonal antibody or a fragment thereof bound to the extracellular domain of integrin alpha10beta1of the sample b), or optionally detecting the second labelled antibody or a fragment thereof in c) bound to the monoclonal antibody or a fragment thereof,

thereby detecting the chondrocyte.

24. A method for detecting an ES cell in a sample, the method comprising the steps of

a) providing a sample cell suspension comprising an ES cell,

b) contacting said sample cell suspension with a monoclonal antibody or a fragment thereof binding to the extracellular domain of integrin alpha10beta1,

c) incubating the sample cell suspension and the monoclonal antibody or a fragment thereof under conditions wherein said monoclonal antibody or a fragment thereof forms an antibody-antigen complex with the extracellular domain of integrin alpha10beta1 on an ES cell,
d) optionally adding a second labelled antibody or a fragment thereof to the sample, wherein the second antibody or a fragment thereof binds to the monoclonal antibody or a fragment thereof in b)
e) detecting the monoclonal antibody or a fragment thereof bound to the extracellular domain of integrin alpha10beta1of the sample b), or optionally detecting the second labelled antibody or a fragment thereof in c) bound to the monoclonal antibody or a fragment thereof

thereby detecting the ES cell.

25. A method for blocking the binding of a chondrocyte to an extracellular matrix molecule (ECM), the method comprising the steps of
a) providing a monoclonal antibody or a fragment thereof binding to the extracellular domain of integrin alpha10beta1,
b) contacting said monoclonal antibody with said chondrocyte under conditions wherein said monoclonal antibody or a fragment thereof forms an antibody-antigen complex with the extracellular domain of integrin alpha10beta1
c) incubating the antibody-antigen complex in b) above, thereby blocking the binding of a chondrocyte to said ECM molecule.

26. A method for modulating the signalling of alpha10beta1 on a mammalian mesenchymal stem cell, ES cell or a chondrocyte, the method comprising the steps of
a) providing a monoclonal antibody or a fragment thereof binding to the extracellular I-domain of integrin alpha10beta1,
b) contacting said stem cell or chondrocyte under conditions wherein said monoclonal antibody or a fragment thereof forms an antibody-antigen complex with the extracellular domain of integrin alpha10beta1 on said cells, and
c) incubating said antibody-antigen complex,

thereby modulating the signalling of alpha10beta1 on a human mesenchymal stem cell, ES cell or a chondrocyte.

27. A method for detecting the expression of integrin alpha10beta1 in a tissue sample or on a cell surface, the method comprising the steps of

a) providing a tissue sample or a cell,
b) providing a monoclonal antibody or a fragment thereof binding to the extracellular I-domain of integrin alpha10beta1in the tissue sample or cell,
c) incubating the tissue sample or cell and the monoclonal antibody or a fragment thereof under conditions wherein said monoclonal antibody or a fragment thereof forms an antibody-antigen complex with the extracellular domain of integrin alpha10beta1,
d) optionally adding a second labelled antibody or a fragment thereof to the sample, wherein the second antibody or a fragment thereof binds to the monoclonal antibody or a fragment thereof in b),
e) detecting the monoclonal antibody or a fragment thereof bound to the extracellular domain of integrin alpha10beta1of the sample b), or optionally detecting the second labelled antibody or a fragment thereof in c) bound to the monoclonal antibody or a fragment thereof.

28. A method for in vivo imaging the expression of the integrin alpha10beta1 in a mammal, the method comprising the steps of
a) providing a mammal,
b) providing an monoclonal antibody or a fragment thereof binding to the extracellular I-domain of integrin alpha10beta1, and wherein said monoclonal antibody or a fragment thereof optionally are conjugated,
c) administering the monoclonal antibody or a fragment thereof to the mammal so as to allow the antibody or a fragment thereof to bind to the extracellular I-domain of integrin alpha10beta1of cells in said mammal,
d) optionally adding a second labelled antibody or a fragment thereof to the sample, wherein the second antibody or a fragment thereof binds to the monoclonal antibody or a fragment thereof in c),
e) detecting the monoclonal antibody or a fragment thereof bound to the extracellular I-domain of integrin alpha10beta1of said cells in c), or optionally detecting the second labelled antibody or a fragment thereof in d) bound to the monoclonal antibody or a fragment thereof, and
f) creating an image of the detected antibody or a fragment thereof,
thereby imaging the expression of integrin alpha10beta1 on cells in a mammal in vivo.

29. The method according to claim 28, wherein the extracellular I-domain of integrin alpha10beta1 is on a cell in an atherosclerotic plaque in a blood vessel.

30. The methods according to any of claims 22-29, wherein the monoclonal antibody or a fragment thereof binding to the extracellular I-domain of integrin alpha10beta1 is produced by a cell line according to claim 1.

31. A composition comprising a monoclonal antibody capable of binding to a protein which is specifically recognized by the monoclonal antibody produced by the hybridoma deposited at the Deutsche Sammlung von Microorganismen und Zellkulturen GmbH under the accession number DSM ACC2583or a fragment thereof.

32. A composition according to claim 31, comprising a monoclonal antibody or a fragment thereof binding to the extracellular I-domain of integrin alpha10beta1.

33. The composition according to claim 32, wherein the monoclonal antibody or a fragment thereof binding to the extracellular I-domain of integrin alpha10beta1 is produced by a cell line according to claim 2.

34. The composition according to any of claims 31-33, wherein the monoclonal antibody or a fragment thereof further comprises a detectable label.

35. An administration vehicle comprising a monoclonal antibody capable of binding to a protein which is specifically recognized by the monoclonal antibody produced by the hybridoma deposited at the Deutsche Sammlung von Microorganismen und Zellkulturen GmbH under the accession number DSM ACC2583 or a fragment thereof.

36. An administration vehicle according to claim 35, comprising a monoclonal antibody or a fragment thereof binding to the extracellular I-domain of integrin alpha10beta1, a pharmaceutical acceptable carrier, and a pharmaceutical acceptable drug affecting joint diseases or atherosclerosis.

37. The administration vehicle according to claim 36, wherein the monoclonal antibody or a fragment thereof binding to the extracellular I-domain of integrin alpha10beta1 is produced by the cell line according to claim 2.

38. Use of a monoclonal antibody or a fragment thereof binding to the extracellular I-domain of integrin alpha10beta1, for the preparation of a pharmaceutical composition for the treatment of musculoskeletal diseases, arthritis or atherosclerosis.

39. The use according to claim 38, wherein the monoclonal antibody or a fragment thereof binding to the extracellular I-domain of integrin alpha10beta1 is produced by the cell line according to claim 2.

40. Use of a monoclonal antibody or a fragment thereof binding to the extracellular I-domain of integrin alpha10beta1 for the preparation of a pharmaceutical composition for gene therapy treatment of musculoskeletal diseases, arthritis or atherosclerosis.

41. The use according to claim 40, wherein the monoclonal antibody or a fragment thereof binding to the extracellular I-domain of integrin alpha10beta1 is produced by the cell line according to claim 2.

42. The use according to claim 41, wherein the pharmaceutical composition comprises an adenovirus for gene therapy treatment of arthritis.

43. A kit comprising a monoclonal antibody capable of binding to a protein which is specifically recognized by the monoclonal antibody produced by the hybridoma deposited at the Deutsche Sammlung von Microorganismen und Zellkulturen GmbH under the accession number DSM ACC2583 or a fragment thereof.

44. The kit according to claim 43, comprising a monoclonal antibody binding to the extracellular I-domain of integrin alpha10beta1.

45. The kit according to claim 44, wherein the monoclonal antibody or a fragment thereof binding to the extracellular I-domain of integrin alpha10beta1 is produced by the cell line according to claim 2.

46. The kit according to any of claims 43-45, wherein the monoclonal antibody or a fragment thereof is bound to a solid phase.

47. The kit according to any of claims 43-46, wherein the monoclonal antibody or a fragment thereof comprises a detectable label.

48. A kit comprising a hybridoma cell line according to claim 2, and a cell culture medium for said hybridoma cell line.